

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 15 JUN 2005

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Applicant's or agent's file reference 116257 EMT2/sko		FOR FURTHER ACTION		See Form PCT/PEA416
International application No. PCT/NO2004/000116		International filing date (day/month/year) 23.04.2004	Priority date (day/month/year) 23.04.2003	
International Patent Classification (IPC) or national classification and IPC C02F1/48				
Applicant EMT RESEARCH ASA				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 1 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 22.02.2005		Date of completion of this report 14.06.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Liebig, T Telephone No. +31 70 340-2746		



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NO2004/000116

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-10 as originally filed

Claims, Numbers

1-7 filed with telefax on 22.02.2005

Drawings, Sheets

1/8-8/8 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☒ the claims, Nos. 8,9
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NO2004/000116

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	none
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	none
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	none

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability
citations and explanations supporting such statement**

1 Reference is made to the following documents:

D1: US6334957

D2: ANONYMOUS: "Strom reduser friksjonen", INTERNET ARTICLE, 4th of March
2002, Retrieved from the Internet under the following URL
http://www.emtr.no/Newsroom/stm_reduserer.htm

2 The document D1 is regarded as being the closest prior art to the subject-matter of method claim 1, and discloses a method for reducing flow resistance in pipes or ducts by imposing a direct current (DC) electric potential on a wall of the pipe/duct in order to remove electric contribution to a friction factor, where the imposed DC electric potential is regulated by a regulating unit which is fed with information of measured fluid properties. The imposed DC electric potential is controlled so that the imposed DC-potential has the same strength but with opposed polarity as the naturally occurring potential due to build-up of electrical charges on the wall from the interaction between the flowing fluid and the wall (see D1, claim 1).

The subject-matter of claim 1 therefore differs from this known method in that the same method is used to reduce fouling and/or scaling. The subject-matter of claim 1 is thus new (Article 33(2) PCT).

The problem to be solved by the present invention may therefore be regarded as a new use for the method known from D1.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

i) The document D1 itself does not provide a hint that the method could be used for reducing fouling/scaling. On the contrary, the prior art cited in D1 (col. 1, l. 35-44, col. 2, l. 26-31) refers to different processes in the context of scale prevention which are not related to the method of the invention, thereby leading the skilled person away from considering the method for this purpose.

ii) Although D2 mentions indications for a reduction of fouling inside pipes of hydroelectric power plants during the application of electromagnetic methods (see last paragraph), there is no indication that the method would also be applicable in a more general way for reducing fouling/scaling in process equipment. In addition to that there is no direct reference to D1 in D2 and the nature of the fouling (biofouling, scaling) is not specified.

iii) Consequently, although the combination of the documents D1 and D2 might appear plausible retrospectively (Ex-Post-Facto analysis) it cannot be considered to be obvious to the skilled person at the time of filing.

3 Claims 2-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A method for reducing fouling and/or scaling in process equipment containing flowing fluids, by imposing a direct current (DC) electric potential on the wall of the pipe/duct in order to remove the electric contribution to the friction factor, where the imposed DC electric potential is regulated by a regulating unit which is fed with information of measured fluid properties, characterised in that the imposed DC electric potential is constantly regulated such that the imposed DC-potential has the exact same strength but with opposed polarity as the naturally occurring potential due to build-up of electrical charges on the wall from the interaction between the flowing fluid and wall material.
2. A method according to claim 1, characterised in that the regulating unit is fed with information of measured fluid properties upstream of the part of the pipe/duct that is exposed to the DC field, and that the measured fluid properties may be one or more of the properties contained in the group comprising average flow velocity, corrosion potential, pH, concentration of specific ions contained in the fluid, electrical conductivity, pressure, and temperature.
3. A method according to claim 1 or 2, characterised in that the DC electric potential is in the range of -5.0 to +5.0 V (saturated calomel electrode, SCE).
4. A method according to claims 1 - 3, characterised in that the DC electric potential is in the range of -2.5 to +2.5 V (saturated calomel electrode, SCE).
5. A method according to claims 1 - 3, characterised in that the DC electric potential is in the range of -1.0 to +1.0 V (saturated calomel electrode, SCE) or less.
6. A method according to claims 1 - 5, characterised in that the flow is a streaming pure fluid in gas or liquid state, a colloidal fluid, a fluid which contains inclusions in the form of particles, a mixture of several fluids, in single or multiphase, or a mixture of one or more of these
7. A method according to claim 1 - 6, characterised in that the flow can have Reynolds numbers in the range 1 to 5 000 000.